



Extreme differences in akinete, heterocyte and cylindrospermopsin concentrations with depth in a successive bloom involving *Aphanizomenon ovalisporum* (Forti) and *Cylindrospermopsis raciborskii* (Woloszynska) Seenaya and Subba Raju

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Year: 2011
Journal: Harmful Algae. 10 (3): 265-276

Abstract:

This paper describes the species-specific responses recorded from two toxin-producing cyanobacteria *Aphanizomenon ovalisporum* (Forti) and *Cylindrospermopsis raciborskii* (Woloszynska) Seenaya and Subba Raju as they approached an overwintering phase in Cobaki Lake (New South Wales, Australia). Each species was examined from samples collected at every metre from a time series of depth profiles and analyzed with respect to growth of specialized cells (heterocytes and akinetes), presence of cylindrospermopsins and the accompanying seasonal dynamics of the water body. Growth and dominance of each species was linked to differing seasonal environmental conditions. Both *A. ovalisporum* and *C. raciborskii* produced specialized cells during the bloom. As the water chemistry changed, *A. ovalisporum* produced akinetes before experiencing a rapid decline in cell numbers. In contrast, *C. raciborskii* continued to bloom without producing detectable akinetes. Peak *C. raciborskii* cell concentrations (83,160 cells mL⁻¹) occurred in the late autumn, when surface water temperatures were 19.1 degrees C, and were accompanied by concentrations of total cylindrospermopsins in the hypolimnion exceeding 100 µg L⁻¹. These toxin concentrations were highly positively correlated with conductivity, soluble iron, bioavailable nutrient species and heterocyte densities. This is the first field study to provide evidence that *C. raciborskii*, despite being traditionally considered a tropical species, can be highly toxic in cooler waters especially when accompanied by strong stratification involving an anoxic semi-saline hypolimnion. This has serious implications for both water quality management and human health risks in those subtropical climates where *C. raciborskii* is present. (C) 2010 Elsevier B.V. All rights reserved.

Source: <http://dx.doi.org/10.1016/j.hal.2010.10.006>

Resource Description

Exposure : ☒

weather or climate related pathway by which climate change affects health

Food/Water Quality, Precipitation, Temperature

Food/Water Quality: Biotoxin/Algal Bloom, Other Water Quality Issue

Water Quality (other): Water temperature; Dissolved nitrogen; Dissolved phosphate; Dissolved potassium; Eutrophication

Climate Change and Human Health Literature Portal

Temperature: Fluctuations

Geographic Feature: 

resource focuses on specific type of geography

Freshwater

Geographic Location: 

resource focuses on specific location

Non-United States

Non-United States: Australasia

Health Impact: 

specification of health effect or disease related to climate change exposure

General Health Impact

Mitigation/Adaptation: 

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: 

format or standard characteristic of resource

Research Article

Timescale: 

time period studied

Time Scale Unspecified